EXERCISE 5 - Postlab

Part I

1. Describe what you observed while viewing the grains of "lichen powder" under the microscope. Were the movements of the grains random or in a specific direction? Was the rate of movement uniform or did it vary?

2. Explain what was happening at the molecular level to cause the grains of "lichen powder" to vibrate.

Part II

3. Make a scatter diagram of your data from part II, plotting diameter of the dye circles against time. **Make two separate graphs,** one for potassium permanganate and one for methylene blue. On each graph, show the data for all three plates (A, B, and C). Use a different color or symbol for each plate. Make sure that each graph has a descriptive title and that all parts are clearly labeled. Also make sure that each graph occupies a full page and that you place the independent and dependent variables on the correct axes. **Use the "Graphing Checklist" in PreLab 2.8 to make sure you have included all necessary information on your graph**.

4. Next, for each graph prepared in question 3 (one for potassium permanganate and one for methylene blue), use linear regression to determine the equation of the best-fit straight line for the data from each plate (A, B, and C). Plot the 3 best-fit straight lines on each graph, using a different color or style for each line. Also, write down the equation of each best-fit line and clearly show which line corresponds to each equation. When you are finished, you should have 3 best-fit lines and 3 equations displayed on each graph.

5. Examine the 6 linear regression equations that you calculated in question 4. Which part of each equation is a measure of how rapidly diffusion took place?

6. Agar forms a gel when heated in water and allowed to cool. The gel consists of water "trapped" within a network of polysaccharide threads. A denser network of polysaccharide threads will slow down the diffusion of the dye through the trapped water. In your experiment, plates "A" and "C" had the same concentration of agar while plate "B" had a different concentration. In addition, plates "A" and "B" were kept at room temperature while plate "C" was kept in a refrigerator.

   A. Which 2 plates should you compare to see the effect of agar concentration on the rate of diffusion? Based on this comparison, which plate had the higher concentration of agar? Explain your reasoning.

   B. Which 2 plates should you compare to determine the effect of temperature on the rate of diffusion? What does this comparison show? Explain your reasoning.

7. Potassium permanganate has a molecular weight of 158.0 Daltons, and methylene blue has a molecular weight of 373.9 Daltons. Based on your results, what can you conclude about the effect of molecular weight on the rate of diffusion? Explain your reasoning.

Parts III & IV

8. For each of your dialysis set-ups, answer the following: Did the dialysis bag gain weight, lose weight, or stay about the same weight? Make a bar graph that shows weight change for each set-up. **Use the "Graphing Checklist" in PreLab 2.8 to make sure you have included all necessary information on your graph**.

9. The change in weight of the dialysis bags during your experiment was mainly due to the net movement of water into or out of the bags. For each dialysis set-up, describe the direction of net movement of water during your experiment (into or out of the bag) and explain why this net movement occurred. **Make sure you give four separate answers—one for each dialysis set-up.**

10. Indicate which solute(s) passed through the dialysis membrane and which solute(s) did not, and explain how you were able to determine this.

11. Explain **why** the solute(s) that passed through the dialysis membrane did, and why the solute(s) that didn't pass through the membrane didn't.

12. Suppose you have a solution containing both salt (NaCl) and glucose, and dialysis tubing with a pore size that allows the passage of Na^+ and Cl^- ions, but doesn't allow the passage of glucose. How could you remove essentially all of the salt from the solution?

Part V

13. When the *Elodea* cells were placed in 10% saline solution:

    A. Describe the visible change that took place and explain why it occurred.

    B. Describe the movement of water across the plasma membrane, and explain why it occurred.

    C. Describe the **net** movement of water across the plasma membrane, and explain why it occurred.

14. When the *Elodea* cells were placed back in distilled water:

    A. Describe the visible change that took place and explain why it occurred.

    B. Describe the movement of water across the plasma membrane, and explain why it occurred.

    C. Describe the **net** movement of water across the plasma membrane, and explain why it occurred.

15. If you repeated this experiment using animal cells instead of plant cells, what do you think you would have observed that was different from what you observed in plant cells? Explain your reasoning.